MAC 2313 Calculus—Analytic Geometry III
Homework #1

Please hand in your solutions by January 30, 2009, 9:07 a.m. Solutions that are handed in later will be graded with 0 points.

Problem 1: (Vectors) (3P+2P)

(a) Find two different perpendicular vectors \( u, v \) such that each is also perpendicular to the vector \( w = \langle -4, 2, 5 \rangle \).
(b) Find two different vectors of length 42, each of which is perpendicular to both \(-4i + 5j + k\) and \(4i + j\).

Problem 2 (Planes) (2P+3P+3P)

(a) Find the equation of a plane through the point \( S(-1, 2, -3) \) that is parallel to the plane \( M: 2x - 3y - 4z = 0 \).
(b) Find a plane parallel to the plane \( N: 2x + 3y - 5z = 0 \) that has distance 42 from \( N \).
(c) Determine if the two planes \( M \) and \( N \) above are parallel. If yes, determine their distance, if no determine their angle of intersection, and the line of intersection.

Problem 3 (Cross product) (2P)

Specify two vectors \( x, y \in \mathbb{R}^3 \) such that
\[ \langle \pi, e, 42 \rangle \times (x - y) = 0 \]
and \( |x| \neq |y| \).

Good luck, have fun & do not hesitate to ask questions!!!